

Outdoor Container Study Status at UMD Research Station

2013 Work to Date

- Existing sulfate-addition experiments designed to quantify the response of wild rice growth continued in 2013 at the UMD research station. Tanks were monitored weekly and dosed with sulfate to maintain the following surface water concentrations (control, 50, 100, 150, 300 mg/L). There were six replicate tanks per treatment, for a total of 30 tanks.
- One change was made for the 2013 growing season: immediately after the spring thaw, a vertical plastic baffle was inserted in each of the 30 tanks to isolate about 15% of the sediment at the end of each tank. As wild rice seedlings emerged, seedlings were removed from the isolated end. The purpose of creating a wild rice-free area was to assess the effect of rooted plants on the geochemistry of the sediment (the overlying water was not divided by the baffle). See schematic on next page.
- Data was collected on survival of seedlings, growth of vegetative tissue, seed production, and seed weight.
- Changes in sediment porewater chemistry were quantified through monthly sampling of both the planted and unplanted sides of four representative mesocosms across the range of sulfate concentrations:
 - Profiles of sediment porewater sulfide and iron were measured with peepers monthly May through September (Nate Johnson, lead researcher).
 - 10-cm long in-situ Rhizon (artificial root with 0.2 micron pore size) porewater samples of sulfide and iron were obtained monthly to compare to stratigraphic peeper concentrations. Surface water samples were taken for analysis of analytical suite performed at all field sites (Amy Myrbo, lead researcher).
 - In late August a one-time sampling of both sides of all 30 mesocosms was performed: 10-cm in-situ Rhizon samples for iron and sulfide from each side, in-situ sediment pH of each side, and surface water samples (Amy Myrbo, lead researcher).
 - Small-diameter (about 1.5 inches) sediment cores from the four representative mesocosms were collected each month, adjacent to each of the two peepers in each mesocosm, just prior to retrieval of the peepers. The sediment was sliced stratigraphically at the same vertical intervals as the peepers. The sediment will be analyzed for extractable iron, acid volatile sulfide (AVS), and extractable phosphorus. (Collaboration between Amy Myrbo and Daniel Engstrom of the Science Museum of Minnesota).

Work Remaining

- Analysis of sediment samples.
- Database development, data analysis and integration of data from all experiments.
- Comparison of Rhizon porewater sample concentrations of sulfide and iron to the more detailed stratigraphic concentrations obtained from the peepers.
- Report writing—final reports due 12/31/13.

Items of Note for 2013

- Source of seeds in tanks was from seed produced in that tank in the prior season (2012).
- All tanks included a partitioned section for sampling the tank sediments that excluded any plant growth.
- Significant seedling mortality occurred after thinning but before the floating leaf stage.
- Due to unusual seedling mortality in 2013, heights and condition of all plants in each tank were noted weekly instead of sampling a subset of individual plants.
- All seeds were harvested from each tank, separated into viable (filled) and non-viable (empty) seeds, counted, weighed, and then returned to tanks within 24 hours.
- All plants clipped at sediment surface and weighed for each tank.

Container
design for
2013
sulfate-
addition
experiment
in 100-gallon
stock tanks
(schematic)

